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Embedding simulation in genetic counselor education from the first week of training: Learning outcomes, standardized clients, and students' satisfaction

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Abstract

Health professional educators routinely utilize simulation to prepare students for practice. However, there is little evidence to show whether simulation enhances learning for genetic counseling students. This study aimed to (i) develop simulation learning outcomes and standardized clients for genetic counselor student education and (ii) evaluate students' experiences of learning from face-to-face and virtual simulation in the first week of training in an Australasian master of genetic counseling program. Using the principles of co-design, eight experienced genetic counselors from across Australasia attended an online discussion and one-to-one meetings to develop simulation learning outcomes and build detailed authentic standardized clients. Six learning outcomes were identified: establishing an effective counseling relationship, eliciting information, assessing need, delivering difficult news and helping clients cope with complex emotions, effective communication and facilitating adaptation. Standardized clients were mapped to the learning outcomes and other requirements of the program. Between 2019 and 2022, 106 first year students participated in face-to-face or virtual simulation workshops with two standardized clients on Day 5 of their training. Following the experience, 103 students completed an anonymous survey using a modified version of a validated satisfaction with simulation scale ($n=49$ face-to-face in 2019 and 2020 and $n=54$ virtual in 2021 and 2022). Responses were analyzed using descriptive statistics and content analysis. Mean satisfaction overall was 95.9% (SD 3.5), 96.2 (SD 4.0) face-to-face, and 95.8 (SD 3.7) virtual. Overall, responses indicated that simulation-based learning and working with standardized clients was a valuable learning experience (100%), developed communication skills and created a sense of reality (99%). For a minority of participants ($n=4$), the simulation was too challenging. Key learning related to consolidation of counseling skills, reflective practice, and preparation for clinical placement. In conclusion, exposing novice student genetic counselors to authentic clinical scenarios using standardized clients in face-to-face or virtual classrooms enhanced clinical learning.

KEYWORDS
education, novice/ student genetic counselor, simulation-based learning, standardized clients

1 | INTRODUCTION

The professional bodies overseeing genetic counselor training require students to gain significant clinical as well as classroom experience (Abacan et al., 2019; Ingvoldstad et al., 2016) However, concerns about client welfare may contribute to hesitancy in allowing students to participate in high stakes conversations with clients while on clinical placement, resulting in graduates who have limited or no experience in tasks such as delivering difficult news (Holt et al., 2013). To build expert communication skills, it is vital that student genetic counselors receive formal training in delivering difficult news and are exposed to challenging genetic counseling situations early in their training (Andoni et al., 2018).

Simulation immerses students in authentic experiences, guaranteeing exposure to learning opportunities which may not be available on clinical placement, and enabling the development of core skills. Students engage in a role play activity with a 'standardized' or 'simulated' client, enabling different students to have similar experiences from a clinical encounter. These "clients" are trained to present a problem accurately and in a standardized manner, reproducing the psychological, emotional, historical, and physical manifestations of a patient (Vu & Barrows, 1994). The terms "standardized" and "simulated" clients/patients are often used interchangeably, creating some confusion (Wallace et al., 2002) Here, we use the term "standardized client" for consistency with our earlier work (Jacobs & McEwen, 2021) to refer to a professional actor provided with a detailed depiction of an anonymized real client and trained to represent their characteristics, responses and behaviors.

Students and facilitators enter into a fictional contract, with agreement that the facilitator will make the simulation as real as possible, and the participant will suspend disbelief (Rudolph et al., 2014). Students repeat the skills practice, reflect on their learning and receive constructive feedback in a supportive environment (Hill et al., 2013; Motola et al., 2013). Simulation has effectively been used to prepare nursing, medical, physiotherapy, occupational therapy and speech pathology students for practice (Blackstock et al., 2013; Cook et al., 2011; Hayden et al., 2014; Hill et al., 2021; Thoma et al., 2015; Ward et al., 2014). High levels of satisfaction and increased confidence have been reported among students following simulation-based learning (Ward et al., 2014, 2015). Among novice nursing and physiotherapy students, increases in self-efficacy and self-confidence have been reported following simulated learning (Alfes, 2011; Bambini et al., 2009; Blackford et al., 2015). There is limited evidence of simulation being used to educate genetic counseling students and genetic trainees (Holt et al., 2013; Jacobs & McEwen, 2021).

Using simulation as a learning tool draws on Kolb's theory of experiential learning in which knowledge is created through the transformation of experience (Kolb, 1984). Within the experiential learning cycle, simulation provides learners with "concrete" learning by enabling active "doing." The experience is followed by review and reflection in a safe environment, enabling assimilation and distillation of the reflections into abstract concepts. In the important final stage of the cycle, the learner can try out the skills they have learnt, serving as a guide to create new experiences (Kolb, 1984).

What is known about this topic

Simulation is widely used in health professional education to prepare students for clinical practice. There are limited studies of the use of simulation to educate student genetic counselors.

What this paper adds to the topic

This paper details the process of developing learning outcomes and building standardized clients for student genetic counselor education. We present the findings of an evaluation of the experiences of novice students exposed to standardized clients for the first time.

The Master of Genetic Counseling program at the University of Technology Sydney (https://www.uts.edu.au/study/find-a-course/master-genetic-counselling), involves online learning combined with two week-long face-to-face teaching blocks per year. Working in pairs, students participate in their first simulation with two standardized clients during their first week of training, prior to experiencing clinical placement. Within the program students often conduct role plays as student-paired activities. Professional actors are used only for high stakes role plays, such as the simulation workshops or two key assessments. The rationale for starting simulation in the first week of training is both pedagogical and logistical. First, students are exposed to authentic experiences (Kolb, 1984), encouraging deep learning from the outset. Second, the simulation workshop contributes to preparation for the initial clinical placement experience, which occurs in the first semester. Students have three further encounters with increasingly complex standardized clients during the two-year program (Jacobs & McEwen, 2021).

The aims of this study were (i) to identify simulation learning outcomes and real-world scenarios to build authentic standardized clients to be embedded throughout the Master of Genetic Counseling program, and (ii) to evaluate students' satisfaction with face-to-face and virtual simulation-based learning in the first week of their training. This work was funded by a UTS Learning and Teaching grant and approved by UTS Human Research Ethics Committee (ETH19-4023).

2 | METHOD

2.1 | Identifying simulation learning outcomes and creating standardized clients

To identify the simulation learning outcomes and create the standardized clients, we used the principles of co-design (Sanders & Stappers, 2008). In 2018, we invited eight senior certified genetic

counselors from a wide range of specialties and locations throughout Australasia to participate in an on-line discussion, followed by a one-to-one Zoom meeting. No incentives were offered for participation. Six genetic counselors participated, all with over 10 years of clinical experience and with cancer, cardiac, prenatal and/or general experience. The purpose of the group discussion was to identify the emotions and characteristics that standardized clients need to portray for authentic student learning, to agree the learning outcomes of the simulation-based learning and to identify potential real-world clients and scenarios. In the one-to-one meetings, we worked with the genetic counselors to develop detailed case studies, including age, socio-economic and educational status, employment, family relationships, attitudes toward genetics and health, experiences of health care and medical and family history, and interactions with genetic counselors. Names, dates of birth, and location were changed to enable us to create standardized clients that reflected the characteristics, responses, and clinical history of the cases without compromising the privacy and confidentiality of the clients or genetic counselors. These case studies were reviewed for accuracy, authenticity, and privacy by the genetic counselor involved. At this point, where necessary to protect privacy, further adaptations were made such as changing the number of children involved, the clients' ages or removing recognizable personal details.

Six simulated learning outcomes were identified around (i) establishing an effective counseling relationship, (ii) eliciting information, (iii) assessing need, (iv) delivering difficult news and helping clients cope with complex emotions, (v) effective communication and (vi) facilitating adaptation (The learning outcomes are shown in full in Figure 1).

Eight real cases were identified which addressed the following broad genetic counseling scenarios: direct-to-consumer testing, treatment-focused genetic testing, variants of uncertain significance, unexpected results, genomic testing in the absence of a diagnosis, prenatal diagnosis and complex family dynamics. From these cases, we developed eight standardized clients.

We mapped the standardized clients to the simulation learning outcomes, and the relevant subject learning outcomes, course-intended learning outcomes, and graduate attributes. The standardized clients and scenarios were reviewed for relevance to the simulated learning outcomes by the genetic counselor participants. Finally, we mapped the standardized clients and learning outcomes to the university sessions (the Master of Genetic Counseling consists of four sessions over 2 years) to determine the order in which the students would work with them, enabling a gradual transition from straightforward to more complex counseling issues (see Figure 1). The two scenarios selected for the first session were the most straightforward in terms of client characteristics and responses.

2.2 | Evaluation of students' satisfaction with simulation during the first week of training

2.2.1 | Overview of the simulation workshop

The day before the workshop, students were introduced to the concept of simulation and provided with a guidebook which included the timetable for the workshop, a summary of the cases, referral letters and results where relevant. The simulation workshop began with a 20-min whole group pre-brief attended by all students and facilitators. Following introductions, the nature, purpose, setting, and ground rules of the simulation were explained, including experiential learning theory, the basic assumptions of simulation, the fictional contract and the importance of safety and confidentiality. The students were then allocated to smaller groups of eight to work with two genetic counselor facilitators, one of whom was member of the academic staff and the other a genetic counselor working in clinical practice. Due to financial constraints associated with the cost of employing professional actors, students worked in pairs for the simulated activity. The advantage of working in pairs was that students were able to support each other

Simulated learning outcomes	Year 1		Year 2	
	Semester 1	Semester 2	Semester 3	Semester 4
Establish an effective counseling relationship showing unconditional positive regard	X	X	X	X
Elicit personal and sensitive information to identify the individuals' needs and understanding	X	X	X	X
Undertake an individual assessment and modify communication according to the individual's needs		X	X	X
Deliver (or sit with) difficult news and assist clients and families to cope with complex emotions			X	
Communicate effectively with all parties in the best interests of the client				X
Facilitate client(s) understanding, adjustment and adaptation in response to genetic counseling				X

FIGURE 1 Simulated learning outcomes mapped to stage of training.

during the simulation and experience co-counseling. The disadvantage was that students did not have an opportunity to counsel the client individually. During the pre-brief, students agreed on how they would manage the co-counseling. Some chose to share the sessions equally, while others agreed that one student would lead the morning session and the other lead the afternoon session. The pre-brief in the smaller groups (30 min) involved discussion of the case, addressing students' questions or concerns and time for the students to work through an optional pre-simulation activity, with the aim of helping them to think about what the issues might be for the client and how they might work together to meet the learning outcomes.

For the simulated activity, each pair worked with the first client for 15 min in turn with the rest of the small group observing. Once all the role plays had been completed with the first client, the facilitators led the de-brief (60 min). Using Pendleton's "Ask then tell" feedback model (1984), facilitators first asked each student to reflect with the group on what went well. Observing students, actors and facilitators then provided positive feedback to individual students, and facilitators provided constructive critical feedback to the group. The procedure was repeated for the second client, followed by a de-brief in small groups of the learning from the day (30 min). All students and facilitators re-grouped for a final wrap-up and reflection at the end of the workshop (15 min).

In 2019 and 2020, the simulation workshop was face-to-face. In 2021 and 2022, the workshop was held virtually via Zoom due to a global pandemic. The format of the workshop was the same regardless of the mode of learning although some adjustments were made to accommodate the virtual environment. The procedures for training actors and facilitators and the adjustments for the virtual setting have been described elsewhere (Jacobs & McEwen, 2021; McEwen & Jacobs, 2021). There was no formal assessment of students' performance or graded assessment.

2.2.2 | Learning outcomes, standardized clients and students' roles for the first simulation workshop

The learning outcomes for the first teaching block were "Establish an effective counseling relationship showing unconditional positive regard" and "Elicit personal and sensitive information to identify the individuals' needs and understanding".

The first standardized client was a 37-year-old woman who had received abnormal results from direct-to-consumer testing suggesting a genetic predisposition to hypertrophic cardiomyopathy. The second client was a 28-year-old woman recently diagnosed with Grade III Triple negative breast cancer and referred for urgent genetic testing to inform treatment.

The students took the role of a first-year genetic counseling student at the start of the genetic counseling consultation, welcoming the client into the clinic, building rapport to establish an effective counseling relationship, and asking questions to elicit information and identify the client's needs and understanding. Students were not required to discuss genetic testing or the implications of the client's condition.

2.2.3 | Sample and recruitment

All students who attended the first teaching block between 2019 and 2022 were eligible to participate in the evaluation. Surveys were distributed by an academic support officer following the simulation workshop. For those learning face-to-face, a paper version of the survey was distributed. For those learning virtually, surveys were distributed online using Qualtrics software. Participation in the evaluation was voluntary and anonymous. To protect confidentiality, we did not collect demographic data.

2.2.4 | Instrumentation

We used a modified version of the "Satisfaction with Standardized Experience Scale" (Levett-Jones et al., 2011). The tool was originally developed for simulation with mannequins and involved statements on de-brief and reflection, clinical reasoning, and clinical learning. The version we used included statements about the pre-brief, simulated activity, de-brief, and clinical learning. This version of the tool had been extensively used for internal evaluation within nurse education in the university prior to applying it in our study. The survey required responses on a 5-point Likert scale to 32 statements about pre-brief, simulation, de-brief, and clinical learning (see Table 1). Possible responses ranged from strongly disagree (1) to strongly agree (5). Participants were invited to comment on the most important lesson learned, the most and least beneficial aspects of the session, timing, facilitators' teaching style and the use of standardized clients.

2.2.5 | Data analysis

For each statement, we calculated the proportion (n) of statements where participants strongly disagreed, disagreed or were unsure (disagreed), and strongly agreed or agreed (agreed). Using these calculations, we determined the mean (SD) proportion for the pre-brief, simulation, de-brief and clinical learning, and the whole experience overall for each cohort individually, all cohorts combined, face-to-face simulations only and virtual simulations only. For one of the clinical learning statements ("The simulation was too challenging"), the statement was reversed for analysis, that is, "The simulation was not too challenging." We used content analysis (Silverman, 2006) to organize participants' comments about the most important lesson learned as this information was not collected by the Likert scales. Other comments were used to elucidate the survey findings. The descriptive statistics and content analysis was conducted by CJ and validated by AM. All results were discussed and agreed by both authors.

TABLE 1 Overall satisfaction with each statement on the modified satisfaction with simulation scale: mean percentage (*n*).

Number	Statement	Not satisfied	Satisfied
Pre-brief			
1	The facilitators provided adequate orientation to simulation[a]	1.96 (2)	98.0 (100)
2	The facilitators provided an overview of the scenario[a]	7.8 (8)	92.2 (94)
3	I had the opportunity to reflect on the given scenario and plan my encounter with the standardized client	3.9 (4)	96.1 (99)
4	I found the pre-simulation activity helpful in planning my encounter	10.7 (11)	89.3 (92)
5	I was able to identify what was required of me in simulation during the pre-briefing session	10.7 (11)	89.3 (92)
6	The session provided an opportunity to ask questions	4.9 (5)	95.1 (99)
7	The facilitators made me feel comfortable and at ease during the session	1.0 (1)	99.0 (102)
8	Timing for pre-briefing sessions was adequate	13.6 (14)	86.4 (89)
Simulated activity			
9	Working with standardized clients created a sense of reality for me	1.0 (1)	99.0 (102)
10	Working with standardized clients was beneficial to my learning	0.0 (0)	100.0 (103)
11	The simulation enabled me to demonstrate my clinical communication skills	1.9 (2)	98.1 (101)
12	The simulation developed my clinical communication skills	1.0 (1)	99.0 (102)
13	The simulation developed my ability to work in a team[a]	3.9 (4)	96.1 (98)
14	This was a valuable learning experience	0.0 (0)	100.0 (103)
15	The facilitator made me feel comfortable and at ease during the session[a]	4.9 (5)	95.1 (97)
16	Timing for simulation sessions was adequate[a]	1.0 (1)	99.0 (101)
De-brief			
17	The facilitator provided constructive criticism during the session	7.8 (8)	92.2 (95)
18	The facilitator summarized important issues during the session	1.9 (2)	98.1 (101)
19	Hearing back from the standardized client was beneficial to my learning	2.9 (3)	97.1 (100)
20	I had the opportunity to reflect on and discuss my performance during the session	2.9 (3)	97.1 (100)
21	The session provided an opportunity to ask questions[a]	6.9 (7)	93.1 (94)
22	The facilitator provided feedback that helped me to develop my clinical communication skills	1.9 (2)	98.1 (101)
23	Reflecting on and discussing the simulation enhanced my learning	0 (0.0)	100 (103)
24	The facilitator's questions helped me learn	6.8 (7)	93.2 (96)
25	I received feedback during the debriefing that helped me to learn	5.8 (6)	94.2 (97)
26	The facilitator made me feel comfortable and at ease during the session	1.9 (2)	98.1 (101)
27	Timing for debriefing sessions was adequate	6.8 (7)	93.2 (96)
Clinical learning			
28	The simulation caused me to reflect on my clinical ability[a]	2.0 (2)	98.0 (100)
29	The simulation was NOT too challenging[a,b]	3.9 (4)	96.1 (98)
30	Participating in simulation helped me apply what I have already learned[a]	4.0 (4)	96.0 (97)
31	The simulation helped me to recognize my clinical strengths and weaknesses[a]	5.9 (6)	94.1 (96)
32	Overall, this was a valuable experience[a]	0.0 (0)	100.0 (102)

[a]The number of participants responding to marked statements was less than 103, indicating that some participants selected not to respond.
[b]Worded as "The simulation was too challenging" in the survey and reversed for analysis.

3 | RESULTS

Between 2019 and 2022, 106 students (four cohorts) participated in simulation workshops on the fifth day of the first teaching block. 103 students (97.2%) completed the evaluation study. The mean number of participants in each cohort was 25.8 (range 24–33). Mean overall satisfaction was 95.9% (SD 3.5; Table 1). Overall satisfaction for those working face-to-face (mean $n=48.4$) was 96.2% (SD 4.0), and virtually (mean $n=53.8$) was 95.8 (SD 3.7; Table 2). Satisfaction was similar across each year group (Table 3).

3.1 | Pre-brief

On average, 93.2% (mean $n=95.8$, range 89–102) of all responses indicated satisfaction with the pre-brief. Mean satisfaction with the

TABLE 2 Not satisfied/satisfied responses overall, face to face, and virtual: mean percentage (*n*).

	Overall mean *n* = 102.6		Face-to-face mean *n* = 48.4		Virtual mean *n* = 53.8	
Activity	**Not satisfied**	**Satisfied**	**Not satisfied**	**Satisfied**	**Not satisfied**	**Satisfied**
Pre-brief	7.0 (6.8)	93.2 (95.8)	6.6 (3.3)	93.4 (45.8)	7.0 (3.8)	93.0 (50)
Simulated activity	1.7 (1.8)	98.3 (100.9)	2.5 (1.0)	98.0 (47.9)	1.4 (0.75)	98.6 (53)
De-brief	4.2 (4.3)	95.8 (98.6)	3.9 (1.9)	96.1 (47.1)	4.4 (2.4)	95.6 (51.5)
Clinical learning	3.2 (3.2)	96.9 (98.6)	2.1 (1.0)	97.9 (46.8)	4.0 (2.2)	95.9 (51.8)
Overall	4.1 (4.2)	95.9 (98.4)	3.8 (1.9)	96.2 (46.9)	4.2 (2.3)	95.8 (51.5)

TABLE 3 Proportion of participants satisfied/not satisfied with each virtual clinical experience per year group.

Mode of delivery	Year	Activity	Mean response (*n*)	Not satisfied mean %	Satisfied mean %
Face to face	2019	Pre-brief	24	5.73	94.27
		Sim	23.88	1.59	98.41
		De-brief	24	3.03	96.97
		Clinical learning	23.8	3.3	96.7
	2020	Pre-brief	25	7.5	92.5
		Sim	25	2.5	97.5
		De-brief	25	4.73	95.27
		Clinical learning	25	4.42	95.58
Virtual	2021	Pre-brief	22.75	14.77	85.23
		Sim	22.88	2.2	97.8
		De-brief	22.91	5.17	94.83
		Clinical learning	22.87	6.63	93.37
	2022	Pre-brief	31	2.02	97.98
		Sim	30.88	0.81	99.19
		De-brief	30.91	3.84	96.16
		Clinical learning	31	4.52	95.48

pre-brief for the face-to-face simulation was 93.4% (mean *n* = 45.8, range 42–49), and for the virtual simulation 93% (mean *n* = 50, range 46–53). Overall, 99% (*n* = 99) of participants reported that the facilitators helped them to feel comfortable and at ease during the pre-brief.

10.7% (mean *n* = 11) of participants did not find the pre-simulation activity helpful in preparing them for the encounter and were unable to identify what was required of them in the simulation from the pre-brief. 13.6% (*n* = 14) found the timing of the pre-brief inadequate. From the comments, it seems that this session was too short.

> It was great to have the pre-brief but I felt it wasn't long enough to discuss with my partner and so I felt a bit unprepared with the simulations, and what to ask and what my partner was going to ask.
>
> (2019, face to face)

> (The) pre-brief was still beneficial but there was not enough time to plan/prepare.
>
> (2022, virtual)

3.2 | Simulated activity

On average, 98.3% (mean *n* = 100.9, range 97–102) of responses indicated satisfaction with the simulated activity. Mean satisfaction with the simulated activity for the face-to-face simulation was 98% (mean *n* = 47.9, range 46–49), and for the virtual simulation 98.6% (mean *n* = 53, range 51–54). Overall, 100% (*n* = 100) of responses agreed that the simulated activity was beneficial to learning and was a valuable learning experience. Comments supporting this finding included:

> The first (client) allowed me to practice a wider range of skills in a more comfortable scenario. The second put me out of my comfort zone and gave me more room for open questions.
>
> (2020, face-to-face)

> Practicing pauses and allowing clients to speak their minds freely without directing conversation - both sessions (were) important in learning this.
>
> (2021, virtual)

Overall, 99% ($n = 99$) of responses agreed that the activity developed clinical communication skills and created a sense of reality. Comments included:

> I found it to be perhaps as close to 'real' situations as we can get and found that extremely helpful and beneficial to my learning
>
> (2019, face-to-face).

> The use of standardized clients created a very real setting which helped me get into the 'zone'
>
> (2022, virtual).

3.3 | De-brief

On average, 95.8% (mean $n = 98.96$, range 94–103) of responses indicated satisfaction with the de-brief. Mean satisfaction with the de-brief for the face-to-face simulation was 96.1% (mean $n = 47$, range 45–49), and for the virtual simulation 95.6% (mean $n = 51.5$, range 47–53). Overall, 100% ($n = 103$) of responses agreed that reflecting on and discussing the simulation with the facilitators enhanced learning. Comments supported this finding:

> The de-brief session where the facilitators critiqued our interactions. I found this really beneficial to my learning, understanding and awareness of how I present
>
> (2019, face-to-face).

> (The de-brief) reinforced our approach to the simulation and provided effective feedback - there was a very noticeable difference in the morning and afternoon session. Most students applied the feedback they received from the first debrief to the afternoon session
>
> (2022, virtual).

3.4 | Clinical learning

On average, 96.9% (mean $n = 98.6$, range 96–102) of responses indicated satisfaction with clinical learning. Mean satisfaction with clinical learning for the face-to-face simulation was 97.9% (mean $n = 46.8$, range 45–48) and for virtual simulation 95.9% (mean $n = 51.8$, range 49–54). Overall, 100% ($n = 102$) of responses agreed that the whole activity was a valuable experience. Comments supporting these findings included:

> I thought it was an amazing experience this early on to get practice building rapport and eliciting sensitive information from people we do not know.
>
> (2020, face-to-face)

> Loved it! Made me feel like I was in the right place.
>
> (2021, virtual)

Overall, 3.9% ($n = 4$) of participants found the simulation activity too challenging. In response to the question "Which aspect of the simulation was too challenging and how could this be improved?," there were three responses: Two about the confronting nature of talking with a sick client and the other was about needing more preparation time.

3.5 | Key learning

There were 92 comments in response to the question, "What was the most important lesson learned?" 59.8% ($n = 55$) of comments related to consolidation of skills learned during the teaching block, including counseling skills ($n = 30$), being client-centered and client-led ($n = 15$), addressing difficult or uncomfortable topics ($n = 6$) and teamwork ($n = 4$). 28.3% ($n = 26$) of comments were about reflective practice, both self-reflection on highlighted strengths and weaknesses ($n = 19$) and the benefits of feedback and practice for learning ($n = 7$). 12% ($n = 11$) of comments were about gaining practical and emotional insight into what to expect from clinical placements. Table 4 shows a selection of comments in each of these areas.

4 | DISCUSSION

Simulation learning outcomes and standardized clients were developed collaboratively by experienced clinical and academic genetic counselors and embedded into each stage of learning during the Master of Genetic Counseling program at University of Technology Sydney. Students were exposed to authentic counseling experiences through working with standardized clients in a supportive environment from the outset, with their first simulation taking place at the end of their first week of training. Evaluation of data from four cohorts between 2019 and 2022 found high levels of satisfaction with simulation-based learning early in genetic counseling training, regardless of whether the experience was face-to-face or virtual. Key learning related to consolidation of counseling and teamwork skills, reflective practice, and insight into what to expect from clinical placement.

Working collaboratively with experienced practicing genetic counselors enabled the development of relevant learning outcomes and authentic standardized clients. While the learning outcomes reflect the aims of genetic counseling, the extent to which these can be achieved in a brief, simulated interaction is questionable. Arguably learning outcomes around developing rapport, eliciting information, assessing needs, and adapting communication are more achievable than those around communicating effectively and facilitating adaptation. Participating in simulation based on these learning outcomes does however expose students to each of the key elements

TABLE 4 Selected free text comments in response to the question "What was the most important lesson learned?"

Insight into what to expect from clinical placements (8)	Consolidating counseling skills learning ($n = 56$)				Reflective practice (16)	
	Counseling skills (27)	Being client-centered and client led (18)	Addressing difficult/ uncomfortable topics (7)	Teamwork (4)	Self-reflection (10)	Value of practice and feedback (6)
What telehealth communications can actually be like. I feel like I have a better understanding of what I will be getting into when on placements (2022, virtual)	Techniques that genetic counselors currently practicing actually use, and why (2019, face to face)	Client-based practice - let them lead, follow them (2019, face to face)	To not be afraid of asking questions that seem taboo. I've learned it is awkward wording and pre-warning that makes the question seem "taboo", not the question itself. (2019, face to face)	How beneficial teamwork can be in meeting with a client (2020, face to face)	I learned that I needed to become more comfortable in delving deeper into patients' emotions, and to be confident in also identifying and verbally addressing their non-verbal cues (2019, face to face)	How valuable practice of these exercises are. By getting feedback and them applying those changes for another scenario were invaluable (2019, face to face)
I learnt that it is not as scary or stressful as you might imagine it to be (2020, face to face)	The importance of open-ended questions and silence … A barrage of prepared questions won't established rapport if we don't leave a silence as a space for clients to answer (2020, face to face)	That when interacting with clients it is very important to have no assumptions and that each situation is different (2020, face to face)	How to cope with difficult situations, for example, Meeting the cancer client with headscarf. (2021, face to face)	How to work together with someone to co-counsel (2022, virtual)	I learned a lot more about myself, and my trigger points for panic during rapport building (2020, face to face)	To take all experience as an opportunity to learn (2020, face to face)
How rapport can be effectively established over zoom, and gave real insight into what telehealth might be like (2021, virtual)	How important it is to make the client feel comfortable when you are trying to elicit sensitive information (2021, virtual)	Aim is to uncover the client need/ concerns - not just about condition but as a whole person (2021, virtual)	To address the elephant in the room (2022, virtual)		The simulation helped me to recognize some of my clinical weaknesses and to learn how to work with a fellow student in a simulated clinical setting (2021, virtual)	How valuable simulation-type activities are to my learning in general (2021, virtual)
	How different patients involve different types of interactions and how to adjust my tone, pace, and language according to the situation in front of me (2022, virtual)	Allowing the conversation to be client-driven. Listen to the client's responses and ask follow-up questions instead of jumping straight to the next question (2022, virtual)			I think the most important thing I learned was that I could do it—I had some of the skills and was able to implement them in a "clinical setting," the simulation built my confidence and helped me feel comfortable going into similar settings in the future (2022, virtual)	Practice is key (2022, virtual)

of genetic counseling. Multiple studies have reported that simulation improves learners' confidence and self-efficacy (Alfes, 2011; Bambini et al., 2009; Blackford et al., 2015). Improvements in learners' competency has also been reported (Niu et al., 2022). As with any educational resource, regular review and update of the standardized clients is vitally important to optimize learning.

Participants in our study expressed some dissatisfaction with the pre-brief, with comments suggesting that more time was needed to establish how to work together and facilitate respect and trust. Our findings suggest that it is important to ensure adequate time for the pre-brief that takes place immediately before the simulation activity, as opposed to the whole group pre-brief. This element of simulation helps to establish a psychologically safe learning environment in terms of confidentiality, mutual respect and professional integrity, establishing expectations, and enhancing participation and learning (Rudolph et al., 2014; Stephenson & Poore, 2016). While there is guidance about the content of pre-brief in simulation (McDermott et al., 2022), it seems that there is no consensus on the optimal length of this aspect. It has been suggested however that first time exposure to simulation may require more time for pre-brief than subsequent experiences (Rudolph et al., 2014). While it might be tempting for educators to reduce the length of the pre-brief to save time, the consequences of doing so may be detrimental to students' learning, especially for those experiencing simulation for the first time.

The encounter with standardized clients was acceptable, valuable, and realistic, with much of the students' learning taking place during the debrief with experienced genetic counselor facilitators. This finding is consistent with previous studies which have reported high levels of satisfaction with simulation-based learning among healthcare students (Chau et al., 2022; Warren et al., 2016). The high levels of satisfaction with the simulation reported in our study were regardless of the mode of delivery (face-to-face or virtual). This finding is consistent with the literature, which shows that students are satisfied with virtual simulation-based learning (Padilha et al., 2019; Voillequin et al., 2021).

The timing of the simulation in the students' training did not detract from satisfaction with the experience, despite a minority of participants finding the experience too challenging. Previous studies of simulation-based learning with novice physiotherapy and nursing students have reported increased confidence and preparedness for clinical placement (Bambini et al., 2009; Blackford et al., 2015; Bokken et al., 2008). While our study did not explicitly investigate these areas, the key learning identified (communication skills, reflection, and client-centeredness) reflect core elements of genetic counseling practice, thereby helping students prepare for their first clinical placement. Early exposure to authentic client scenarios providing the experience of "doing" in a supportive and low stakes environment helps students to understand the role they are training for.

Participants reported high levels of satisfaction with the simulation debrief and found that this aspect enhanced clinical learning. In an earlier study of genetic counseling students' satisfaction with virtual clinical experiences, we found similarly high levels of satisfaction with debrief (Jacobs & McEwen, 2021). In addition, several studies have reported on the effectiveness of simulation debrief among nursing and medical students, although it should be noted that much of the simulation in these studies focused on the acquisition of technical rather than counseling skills. An experimental study found a significant increase in student nurses' knowledge and judgment following debrief, despite a significant decrease in mean scores immediately following the simulation experience (Shinnick et al., 2011). Likewise, a quasi-experimental study reported that student nurses demonstrated significantly higher levels of clinical reasoning when a structured debriefing model was used (Forneris et al., 2015). A systematic review of the effectiveness of debriefing following health professional simulation identified 10 randomized control trials which reported a statistically significant improvement between pre- and post-testing in skills performance, task management, team working, and situational awareness (Levett-Jones & Lapkin, 2014). While there is limited consensus on the method, length, and style of debrief, this element is recognized as essential to the simulation experience in the International Nursing Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice (Sittner et al., 2015).

The importance of exposing students to challenging counseling situations early in genetic counselor training (Andoni et al., 2018), alongside increasing genetic counseling workload, and a small workforce (Abacan et al., 2019; Hoskovec et al., 2018), leads to the question of whether simulation can, or should, substitute clinical practice. Randomized control trials in other health disciplines, such as physiotherapy, occupational therapy, medicine, and speech pathology suggest that up to 20% of clinical placements could be replaced by simulation with no loss of competency (Blackstock et al., 2013; Hill et al., 2021; Imms et al., 2018; Watson et al., 2012). In genetic counselor education, a randomized crossover trial examined the efficacy of using videorecording of standardized patients in a brief online intervention. Students exposed to the intervention demonstrated multiple, positive changes to patient-centered communication behavior (Lowe et al., 2023). The use of simulation in genetic counselor education has not, however, been widely reported. Partially in response to the changes to genetic counselor education in the global pandemic, the Human Genetics Society of Australasia course accreditation guidelines (2023) have been updated to include up to 10 days of simulation per year, although no more that 15 days across both years 2023). It is important to note that the long-term impact of simulation on students' learning and graduates' practice is unknown. Future research in this area is warranted.

4.1 | Limitations

Although we checked with the genetic counselors involved in the real cases that the learning outcomes were consistent with the standardized clients and scenarios, the subjective nature of this process means that further work may be needed to validate each standardized client for each learning outcome. This study drew on data from four cohorts from a single educational program during the first week of

training. It is possible that students' satisfaction with the simulation may have been affected by their individual circumstances. However, as we did not report demographic data, any influence this may have had on the results cannot be assessed. Over the 4-year study period, the standardized clients were unchanged, although they were portrayed by different actors each year. While most of the academic facilitators remained the same over the four-year period, there were some changes in the clinical facilitators involved. We (AM and CJ) set up and led the Master's program, established the simulation, and coordinated the simulation workshops. Although the evaluation survey was anonymized and distributed at "arm's length," students were aware of the identity of the researchers. As the program was set up using a blended learning approach, all participants were familiar with Zoom prior to the pandemic. As novice students at the start of a highly competitive program, levels of enthusiasm, excitement, and anxiety at the first opportunity to encounter a "client" were high. All these factors may have influenced participants, making them less critical, more likely to participate and contributing to the high levels of satisfaction. To validate these findings, this study would need to be replicated with different student cohorts, different standardized clients, and different educational programs.

5 | CONCLUSION

Collaboration between clinical and academic genetic counselors led to development of realistic and relevant learning outcomes and authentic standardized clients to embed throughout the program. Exposing novice student genetic counselors to standardized clients in a safe and supportive environment, be that face to face or virtually, prepared students for clinical placement and enhanced learning.

AUTHOR CONTRIBUTIONS

Authors Jacobs and McEwen confirm that they had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors gave final approval of this version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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CONFLICT OF INTEREST STATEMENT

Author Jacobs declares that she has no conflict of interest. Author McEwen declares that she has no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Human studies and informed consent: This study was approved by and conducted according to the ethical standards of University of Technology Sydney Human Research Ethics Committee (HREC). All applicable international, national, and/or institutional guidelines were followed. No informed consent was required from subjects as data were collected anonymously and completion of the online survey was accepted as consent to participate.

Animal studies: No non-human animal studies were carried out by the authors for this article.

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